DOCUMENT RESUME

ED 273 979 CS 210 048

AUTHOR Heap, James L.
TITLE Collaborative Practices during Computer Writing in a First Grade Classroom.
SPONS AGENCY Ontario Dept. of Education, Toronto.; Social Sciences and Humanities Research Council of Canada, Ottawa (Ontario).
PUB DATE Mar 86
CONTRACT 1206-04-777-ASN-62984
GRANT 410-85-0607
NOTE 34p.; Paper presented at the Annual Meeting of the American Educational Research Association (67th, San Francisco, CA, April 16-20, 1986).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; Computer Uses in Education; *Cooperation; Foreign Countries; Grade 1; Microcomputers; Peer Relationship; Primary Education; Teaching Methods; Videotape Recordings; *Word Processing; Writing Exercises; *Writing Instruction; *Writing Processes; *Writing Research
IDENTIFIERS *Collaborative Composing; Ontario

ABSTRACT

A study examined the behavior of first graders as they collaborated on a writing exercise using a word processor. Data were collected over three weeks in the form of fieldnotes and 13.5 hours of videotape of students working at the computer. Videotapes were examined to locate patterns of discourse and physical actions, and by abstracting from the data, the type of structured phenomena which they could be taken to exemplify was idealized. The data revealed these types of behaviors: (1) the student designated as the writer had the right and obligation to compose, the right and responsibility to input, and the right to arrange; (2) the student designated as the helper had the appurtenance to compose, the license to input, and the right to arrange and responsibility for arranging. Concerning production problems during collaboration, the writer had to explain his or her orientation to production problems and how they would be solved, while the helper determined when the designated writer became oriented to problems and how he or she intended to solve those problems. Use of the computer in a collaborative setting enhanced its advantage of allowing writers to input and arrange their screen document with ease, to alter those documents, and to read them. The computer also allowed, and virtually required, students writing together to use all of the language arts. A reference list is included. (SRT)

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COLLABORATIVE PRACTICES DURING COMPUTER WRITING IN A FIRST GRADE CLASSROOM

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James L. Heap

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James L. Heap
Associate Professor
Department of Sociology in Education
Ontario Institute for Studies in Education
252 Bloor St. West
Toronto, Ontario
M5S 1V6

March, 1986

Prepared for presentation at the annual meetings of the American Educational Research Association, San Francisco. Preparation was supported by the Social Sciences and Humanities Research Council of Canada, Grant #410-85-0607. Research reported was funded under contract No. 1206-04-777 ASN 62984 by the Ontario Ministry of Education. This essay reflects the views of the author and not necessarily those of the Council or Ministry. The author appreciates the discussions with, and the comments and support of the following friends and colleagues: Christine Bennett, Clare Brett, Bryant Fillion, Peg Griffin, Angela Hildyard, E. Judy Horn, Hugh Mehan, Shawn Moore, Amelia Nanni, Sharon Purdy, David Rehorick, Margaret Riel, Adele Sanderson, Ronald Silvers, David Smith, Lucy Suchman and Jordan Titus.

CS 210048

COLLABORATIVE PRACTICES DURING WORD PROCESSING IN A FIRST GRADE CLASSROOM

One of the uses of the computer in education which appears to have the most potential for developing basic skills is its use as a word processor (Daiute, 1985). However, there are a number of ways in which it can be used, directed to specific word processing tasks. An especially advantageous form of use, is one which has been least explored (but see Dickinson, 1985): collaborative computer writing. In this essay I want to describe the socio-cultural organization of such writing as it can be seen to have been enacted in one first grade classroom. The focus of the essay is on how the production and coordination problems of writing-together are handled by three sets of practices: composing, inputting and arranging. These practices are examined from a situated perspective as they can be seen to operate within, and affirm, a certain distribution of rights and responsibilities between designated writers and their technical, peer helpers.

The theoretical and methodological perspectives of the essay derives from ethnomethodology. Collaborative writing is conceived as an activity having properties organized by students' displayed orientation to tasks, rights, responsibilities and concerns of deference and demeanor. The operation of cognitive processes in writing are of interest as their operation is made manifest and brought to bear interactionally to solve the collaborators' production and coordination problems of "Where are we?" and "What next?". Having examined collaboration in writing at the computer, I conclude with remarks on the place of computers in language arts education.

PART I

Part I provides a brief overview of the research and its methodology.

THE RESEARCH

Videotaping and observations were done in a first grade classroom at a Catholic Separate School in a prosperous working class section of Toronto. Data was collected during a three week period in May, 1984. Earlier observations had been done for one week in October, 1983, while students learned to use the computer and the word processing software. The data consists of fieldnotes and thirteen and one half hours of videotape of students working at a computer. The teacher was interviewed, and copies of the students' computer-written stories were collected. The teacher, Mrs. Sharon Purdy, was unique, in that she and her husband, Mr. Thomas Purdy, developed and designed the word processing program, Write/One, used in the classroom (Purdy & Purdy, 1983). The year of the study was the third year Mrs. Purdy had used the program in her classroom, but the first time it had been used at the first grade level. Each year she allowed and encouraged students to help each other while working at the computer. Besides teaching, and co-developing the software, Mrs. Purdy acted as a consultant to the research project.

Only one computer was used in the classroom, an Apple II+, lent by the Apple Corporation of Canada, to use the version of Write/One designed to run on the Apple II series. The computer itself was placed on a student desk, with two to three desk chairs clustered

around the computer desk and trolley. Placed next to the teacher's desk, the area was known as the Computer Centre.

The collaboration observed in the first grade classroom was of a specific type. One student was the designated writer, whose turn it was to write. That student would choose a helper, and perhaps allow another student to join in the collaboration as well. The helper position in the classroom arises somewhat spontaneously, according to the teacher. Each year in her class, the students who are the quickest to pick up the fundamentals of using the computer for story writing hang around the computer, offering advice, until an actual position called "helper" is institutionalized by the teacher.

The designated helper, as a collaborator, is supposed to function something like a technical advisor, having primary responsibility for formatting and arranging text on the video monitor through use of the computer keyboard. In practice, however, every helper I observed extended aid to all aspects of writing.

At the Computer Centre, the writer and helper interacted continuously around appropriate responses to program instructions, story titling, sentence development, inputing, arranging the text, using student dictionaries, and closing and printing a story. After printing a hard copy, and having it corrected by the teacher, typically with the writer and helper involved in the correction process, students collaborated in editing/correcting the story on the screen. They then would run off copies of the story for all students in the class. All of these collaborative activities were videotaped, but the analytic focus of this study was upon the interactional work through which writer and helper produce a first draft of a story.

METHODOLOGY OF ETHNOMETHODOLOGY

The approach taken in this research is one version of ethnomethodology (Heap, 1980a, 1984). Ethnomethodology is the study of the practices used by members of a culture to organize their reasoning and actions, and their interactions, as recognizable, intelligible, orderly, i.e., rational, events in a social world (Garfinkel, 1967; Heap, 1984). I regard the essential aim of ethnomethodology to be the generation of knowledge about how human events <u>possibly</u> can be organized, culturally (Heap, 1980a). My animating interest is in recovering the culturally possible ways in which events can "happen," i.e., how they can be organized by members of a culture, such that they can be recognized, and taken for granted, by members of that culture.

The theoretical framework of ethnomethodology is a child of phenomenology and analytic philosophy. From phenomenology (Husserl, 1962; Schutz, 1962) comes a theory of consciousness as a relation between the object-as-known, and the acts through which the object is known. Methodologically, this part of the frame leads to a situated perspective: activity organization is viewed from the perspective of its unfolding, its accomplishment in real time, in situ.

From analytic philosophy (Wittgenstein, 1958; Austin, 1970) comes the notion that language provides both resources and limits for what can be said about events. Methodologically, this part of the frame leads to the requirement that activity organization be formulated from the perspective of what members, i.e., speakers of some culture's language, could understand, could recognize and identify the activity to be. In all this, it is important to note that the ethnomethodologist is also a member of the culture he or she studies. It is by being a member, by sharing the know-how for reproducing activity organization, that the ethnomethodologist can be an analyst

and show how activities can be produced.

In unraveling the complexities of student interaction, I am trying to explicate the culturally possible ways we have in our culture to organize behaviour around tasks. In line with the ethnomethodological requirement that claims about activity structures be based on audio-visually recoverable evidence, I view and review videotapes repeatedly to discover and gather the reminders, the grounds, which support my explication of claims about possible activity structures.

The primary method used in analyzing videotapes and transcripts could be called "possibilizing." The term is suggested by Zaner (1973), but its intent and form as a method derive directly from the work of Husserl (e.g., 1969). It is my belief, though, that the method receives lively use in the work of Wittgenstein (e.g., 1958) (see Heap, 1981).

Essentially, the method, as a set of procedures, consists of examining data, in this case videotapes and transcripts, to locate patterns of discourse and physical actions. Abstracting from the data, I idealize the type of structured phenomena which they can be taken to exemplify. In this way I reach the context-transcendent level of "practices" of collaborative writing.

Using an idealization of some particular practice, I return to the data to see if, and how, strips of videotaped interaction can be treated as possible examples of the idealized pattern. The videotapes offer resistance to my interpretations, by not fitting them well, or adequately, forcing reformulation of what the structure might be. By imaginatively varying properties of the structure, I can begin to trace out the practices of collaboration in composing and in inputting and arranging text. The research thus recovers culturally possible ways in which collaboration during writing can be seen to be organized, at the Primary Level.

PART II

We will now turn to the particular perspective on writing which is needed in order to appreciate production problems facing solo and collaborative writers.

A SITUATED PERSPECTIVE ON WRITING

Collaborative writing at the computer opens up new areas of research for social cognitive science, in that theories of writing cannot be transported fully and in unmodified ways from the domain of handwriting (or even typewriting) by a solo writer, to the domain of word processing by two or more persons. The research reported here begins that modification by treating the presence of the other person, and the use of the computer, as seminal aspects of the writing task environment (cf. Flower & Hayes, 1981: p.369). These aspects involve and require cognitive processes which either differ from those normally treated by cognitive theorists, or produce an alteration in how those processes operate (1).

Collaboration during writing, however, does not appear to alter what is done, and needs to be done in composing. Writing still can be conceived as involving a number of components or processes, e.g., PLANNING, TRANSLATING and REVIEWING. Each of these processes will be made up of sub-processes, e.g., PLANNING consists of GENERATING, ORGANIZING and GOAL-SETTING, which in turn will consist of sub-sub-processes (Hayes and Flower, 1980). At any point in the writing

process, the writer will be expending effort at a number of levels of processing, continuously reconstituting mental representations of plans and the text-so-far (see Scardamalia, Bereiter and Goelman, 1982).

While collaborative writing makes use of these components of composing, it alters how they are organized. That is, the general models of writing so far developed (e.g., Flower and Hayes, 1981) remain useful, but "processing" has to be understood as more complex. This is because there can be a differentiation of tasks, e.g., one person generates ideas while the other offers substantive or procedural facilitation (see Scardamalia and Bereiter, 1985). There also can be, and would seem to need to be, an alteration in how the sub-tasks of writing, "transcribing" (Smith, 1982), are carried out, in situ, in the presence of an Other who has task-based rights and responsibilities.

In order to examine collaborative writing in one classroom, I shall first develop a sense of the production problems which face all writers. Drawing from work in phenomenology, analytic philosophy, ethnomethodology, and conversation analysis (Sacks, Schegloff and Jefferson, 1974), I will make use of a situated perspective on writing. This is an epistemological position, concerned with how phenomena are interpretable from within the settings of their appearance and production (see Heap, 1984). The sociological version of this perspective is concerned with observable-reportable actions and events, e.g., the talk and gestures of interaction in reading lessons as they combine, and can be used, to define what counts as reading, there and then (Heap, 1980b).

As this perspective relates to work on writing, it is akin to process oriented models which aim to give an account of how writing is "shaped at the point of inscription" (transcription).

> "At the point of inscription," the writer, beginning to execute sentence-level plans, confronts varying constraints and potentials: The writer is constrained by the content base of the existing text and by the audience's knowledge level and attitudes. From a cognitive point of view the writer is constrained by the real-time limitations on planning for inscribing the text. Even at the sentence level, the writer always has the potential to evaluate the current text segment and to revise it, relocate it, or eliminate it entirely.
>
> (Matsuhashi and Quinn, 1984: p.330)

The kinship between the situated perspective and process models of writing is only in terms of a concern to orient to phenomena as they unfold in real time. That is, the situated perspective is simply an epistemological stance, the adoption of which entails no commitment to any particular theory of real-time phenomena organization. On the other hand, the situated perspective can, and should, be taken as the perspective from which theory tries to account for real-time phenomena organization, as in process writing theories.

The situated perspective for studying the social organization of writing activities brings to the fore two production problems facing writers. These are problems which process theories of writing can and must address. They are problems "at the point of inscription," in a number of senses.

"WHERE AM I?"

The writer, at every point in a writing activity, needs to know,

or be able to determine, where he or she is in carrying out the actions which constitute the intended activity. The locational problem has a number of levels. The writer must be able to locate where he or she is in the document-transcribed-so-far. This problem is handled in a number of ways. One is through a dependence on document formatting conventions (see Morrison, forthcoming), which allow the writer to locate the point on the page/screen at which transcription stopped or can start. While extremely obvious, these conventions are necessary, for there is nothing preventing transcribing occurring anywhere on a page, including on top of other transcriptions. Some directional principles, like left-right, top-down, are needed. The use of margins, indentations, predrawn lines are all useful.

A second level of the locational problem requires that the writer be able to locate where he or she is in the text-transcribed-so-far. I am treating the signs-appearing-on-a-surface as a document, while the meaning realized through reading those signs can be called the text (see Heap, 1977). The writer must know and be able to recover where he or she is in the production of the text. This locational point will be the same point as he or she is at in the document. However, while the writer can see where the signs "stop" on a page, the writer must know what the signs signify in order to know where he or she is in the intended text, i.e., what he or she has already said as opposed to what yet needs to be said to complete the intended text. To this end, punctuation, paragraphing, headings and pagination are helpful.

There can be a third level of the locational problem. To produce a text, the writer must know or be able to determine where he or she is in executing the plans for the intended text. This problem is especially important in texts which make a number of nested assertions, e.g., scholarly articles. The writer can manage the plan location problem through conventions for indicating sections of the text. These include setting out text with extra space above and/or below headings and sub-headings. The headings and sub-headings can be placed, transcribed and highlighted in a variety of ways, depending on the medium of expression.

The three levels of the location problem can be oriented to, or encountered, at almost any time during writing. As the writer is in the midst of transcribing representations, location problems are not present. However, they can arise if the writer is a slow transcriber, or is distracted, and loses her or his place. When a sentence or paragraph has been transcribed, the writer typically will know where her or she is at the document and text levels, but at this juncture a problem can arise. If the problem is taken up as "how does this fit with the point I wanted to make?", then the problem is what I have called a plan level location problem. However, the writer can know her or his "locations" and still face a directional problem, with levels of its own.

"WHAT NEXT?"

The writer is constrained by the text-so-far, but also is constrained by the what the text-to-be should be. At any point in the writing process, the problem can arise: "What next?" For ease of reference, I will call this the directional problem: where to go from here, from these "locations." Putting the problem this way reveals the dependence of the directional problem, and its resolution, on the locational problem and its resolution, at its three levels.

With regard to the directional problem, document and text levels

combine in interesting ways. At the document level, the problem is what signs/words to use to express the text. At the text level, the problem is what to say. And what to say can be taken up at the plan level, as a way to begin to solve what to say at the text level, and thus what to transcribe at the document level.

These locational and directional problems have been presented using the idealization of writing activity as consisting of movement back and forth between composing and transcribing. But the problems are faced, albeit in different ways, for all ways of writing. And they arise in reflection, where no external representation (document) can be relied upon. In such cases, memory must be used to fix a location from which the direction problem can be taken up, again.

PART III

In order to be in a position to appreciate the features and accomplishments of collaborative word processing for novices, brief consideration will be given to some properties of computer writing. Then attention will be turned to the character of writing during collaboration.

COMPUTERS AND WRITING

While I want to leave the computer in the background -- so as to foreground the organization of collaboration -- a few points must be made about collaboration as it is facilitated, influenced and shaped by the character of the computer as a medium of expression. In my concluding remarks I shall foreground the computer.

A theory of collaborative word processing requires a theory of computer use, which we lack. To appreciate just how major the lack is, in spite of twenty five years of human factors research (cf. Kantowitz, 1983), consider the conceptions of hardware and software available in the literature. Every dictionary of computer terms which I have been able to find defines software as programs for the computer (e.g., Sippl, 1983: pp.352-353). Yet, users do not encounter software in this limited sense. They encounter software as <u>programs for the user</u>, though the programs, as in the case of word processors, are not encountered as computer programs, written in a computer language. In the absence of user-oriented conceptions of hardware and software, I shall use the term "computer" to mean hardware-and-software as encountered from the perspective of the user. Context should make clear where I depart from this usage.

When the computer is used as the medium of expression in writing, a distinction must be introduced within the framework proposed by cognitive theorists. In using the computer to write we still compose, but transcribing becomes differentiated into two types of operations. In phenomenological terms (cf. Husserl, 1962), the operations have three components: act, instrument and object. They are organized as follows.

ACT	>>	INSTRUMENT	>>	OBJECT
1. inputting		display keys		signs & symbols
2. arranging		executive keys		text

Acts of inputting operate through, and on, display keys to produce signs and symbols on some type of display screen. Acts of arranging operate through, and on, executive keys to arrange the signs and symbols on the screen. Transcribing acts are defined as inputting

or arranging in terms of their effect on the display screen. While the keys achieve these effects, they do so in ways much more complicated than the ways in which other instruments, such as styli and even typewriters, achieve their effects.

Glossing much that needs examination, it can be said that keys are indexical (Heap, 1975): their effects are program dependent. What may achieve the display of a sign on the screen at one point in the use of a program, may at some other point achieve an executive effect on the text. For example, in the word processing program WordStar, depressing the "D" key at the "No-File Menu" initiates the sequence for opening a file to edit. Whereas, within a file, depressing the "D" key (alone) produces a "d" on the screen. (Pressing the "D" key while holding down the SHIFT key, or while in a CAPS LOCK mode, produces a "D" on the screen.)

The differentiation of the computer keyboard, as supported by a software program, makes possible the differentiation of writing qua transcribing, into acts of inputting and arranging. Some keys are used to achieve displays on the screen, while others are used to move the cursor, to delete signs and symbols, to bring up new screens, or windows on the screen. Executive keys are also used to move text around on the screen, and to move text to, and off, the screen. Depending on the computer hardware and software, some keys will allow text to be inserted in certain ways on the screen. Some keys, when depressed in tandem with display keys, produce a further set of displays, such as upper case letters, and symbols such as !@#$%^&*().

COMPUTERS AND COLLABORATIVE WRITING

One difficulty with extant theories of writing, with rare exception (Bereiter, 1980), is that they often mistake typical features of writing with styli for essential features of writing. In order to gain a vista from which to appreciate the ways in which the computer makes collaborative word processing feasible, we need consider a number of reports from researchers at the University of California, San Diego.

Margaret Riel (1983) asserts that the computer medium offers new possibilities for social organization and identifies collaborative arrangements and social effects:

- computers enable cooperative work between children that is difficult with the paper and pencil medium.
- the presence of an 'Other' during the writing process facilitates problem-solving in generating ideas and immediate responses to the written text.
- computers create "functional writing environments" that is, contexts with a purpose and an immediate audience for the children's stories.

Corroboration of Riel's observations is provided by Levin and Boruta (1983) who report that, "students share the mechanical task of writing by alternating typing turns, letter by letter, word by word, phrase by phrase, sentence by sentence. We have seen children divide up the task of capitalization with one child pushing the 'shift' key and the other typing the letter...Once the mechanics of collaborative writing are overcome, we have found that children working in pairs on the computer create social/communicative environments that enhance the

benefit of the writing assignment" (1983: pp.292, 293).

Researchers working at UCSD who have studied elementary children working together during word processing, are beginning to re-examine conventional formulations concerning what writing is and what it may become. "Most approaches to computer use and writing presume a lone individual, working in at least temporary isolation. We have uncovered many reasons for challenging this presumption. Many people have suggested the value of collaborative writing, but it is difficult to share a pencil, or to write a text collaboratively on a piece of paper. It is much easier to divide up the work of writing on a word processing system. The display is more public and legible..."(Levin et al, 1983, p.7).

It is precisely the computer's organization (as hardware and software) that both eases the physical task of writing and revising, and affords easier collaboration on a single task by two or more students.

VERBALIZATION OF WRITING

Collaboration during writing consists of social interaction between the writer and the designated helper. Not surprisingly, it turns out that writing at the computer, with two or more persons involved, was done in talk. Writing was talk. Composing was done "aloud," and the "transcribing" of this talk into electronic text was done in talk. Inputting as it occurred during collaborative writing in my set of videotapes was bi-modal. It was done as physical acts, of finding and depressing keys, but also as verbal acts of pronouncing the letter being input.

Not all displayed signs and symbols were pronounced. In inputting a string of signs, i.e., a word, some of the letters typically were pronounced. The ordering of inputting and pronunciation was not consistent across stories or within stories. Pronunciation preceded, followed or coincided with a display key being depressed. There is one circumstance, which is fairly common, where pronunciation preceded or coincided with inputting, but rarely followed it. This was when the spelling of a word was dictated by one student while the other input it.

The one part of collaborative writing at the computer which was not done in talk, or with a verbal accompaniment, usually, was arranging. The helper usually arranged the text, i.e., hit the space bar, the delete key, the cursor keys, the shift key, etc., without naming the key/function with which he or she hit. In the use of two keys, though, verbalization sometimes did occur. Helpers sometimes said "space" when they hit the space bar. In the rare cases when this occurred, it seemed as if the locution had a certain illocutionary force (Austin, 1970). It sounded as if the helper was teaching or reminding the writer that a space was required. The other key whose name was pronounced was the return key. This key was pressed to end a writing session. Uttering "return" seemed to work as a verbal marker for the end of writing.

COLLABORATIVE WRITING AND TURN ORGANIZATION

While collaboritive writing is talk, it is not done as twin soliloquies. Persons take turns in verbalizing writing. The question of just how turns can be organized during collaborative writing is a large one, requiring more attention than I am able to provide here (2). The turn ordering system captured on my videotapes was quite similar to that found in naturally occurring conversation (Sacks, Schegloff and Jefferson, 1974). Either party could self-select as

next speaker and speaker turns could be designed to "select" next speaker (3). However, an understanding of collaborative writing discourse requires a sense of how talk can be connected to the apparent tasks set and affirmed by the actions of participants.

Theorizing about the turn ordering system apparent in the videotapes must account for the properties of the talk which were sensible in the setting, but which would be quite odd if encountered in most other settings. While writing at the computer, turns at talk seemingly were not directly referential. That is, talk which composed the text was rarely talk about the text. Instead, composing talk was a verbal rendering of what the text could be, or what it could be read to be. In its former guise, composing talk consisted of offering possible parts of the story. In its latter form, composing talk, or, what counted as composing talk, consisted of reading aloud what the text-so-far said. The latter was often accompanied by movement of a finger along the line of screen text being read, an action which I call "finger reading."

Another property of talk which a turn ordering system would have to account for is the pronunciation of the signs which are being input. These verbal renderings count as turns at talk because the speaker has the floor: the other person rarely spoke while signs were being pronounced, unless it was to repeat the sign, as when the sign was being dictated for inputting.

Persons do not speak just in order to produce the regularities discovered by conversation analysts. Talk during collaborative efforts typically was task oriented. At least, hearers had the right to expect that talk would be so oriented, though there was always room for disappointment. The relationship between discourse structures and task are not well understood (cf. Heap, 1983). During collaboration, self-selection to speak and the choice of what to say, reflexively established and presumed a distribution of rights and responsibilities in relation to the task, and in relation to the auspices for each speaker being engaged in that task. These rights and responsibilities, as enacted, enforced and negotiated by collaborators, undergirded the resolution of collaborative writing's production and coordination problems.

PART IV

How the acts of writing were carried out was transformed in collaboration by the rights and responsibilities in terms of which participants made their actions intelligible. The distribution of rights and responsibilities had consequences for how the production problems of writing were handled.

RIGHTS AND RESPONSIBILITIES

In Mrs. Purdy's class, when it was the writer's turn to write, the story that was written was the writer's story, not the helper's story. Ownership of the story flowed from the allocation of a turn to write at the computer. As it was the writer's story, and the writer selected the helper (or at least allowed someone to self-select to be a helper), the helper's contribution to what appeared on the screen was allowed to stand only if "authorized" by the writer. As the helper was there only in a technical capacity, because of her or his superior knowledge of the computer, the helper was not a full-fledged collaborator. A jointly authored story was not a sanctionable aim or expectation of parties to the setting.

From analyzing interaction videotaped over a three week period, it was possible to formulate the normative orders invoked, to some extent, and enforced, to some extent, in one class, at the end of the school year. What follows is an analyst's rendering of the social organization of apparently enforceable expectations of writers and helpers. The expectations are not offered as causing the behaviour observed. Instead, the claim being made is that these expectations could be, and were, invoked or implied by students at various points, as normative orders appropriate in the setting. These are the rights and responsibilities students tried to use, tried to enforce, not ones they necessarily lived by:

The WRITER had	The HELPER had
1. right and obligation to compose, responsibility for what is composed	1. appurtenance to compose
2. right to input, responsibility for inputting	2. license to input
3. right to arrange	3. right to arrange, responsibility for arranging

These rights and responsibilities dove-tailed in intricate fashion. One person always had responsibility, while the other had some form of freedom to engage in the activity.

Level One

The writer had the right to compose, and had to exercise that right, i.e., he or she was obligated to compose. Whether the writer composed a part of the story or not, he or she had responsibility for what appeared on the screen, and was treated by the teacher as having responsibility for the hard copy of the text.

While the writer had the right to compose, the helper had only the appurtenance, the incidental privilege, to compose. If the helper is understood as a technical aid, there because he or she knew better than the writer how to operate the computer, then we would not expect the helper to be involved in composition. But on my videotapes helpers were always involved at some point in composition. However, they were involved only in an incidental fashion. They rarely initiated compositional acts. The writer was the one who proposed an idea, or, more often, the wording of a possible story part. Helpers' contributions consisted largely of offering words which could be used in the writer's story.

Evidence supporting the formulation of rights and responsibilities for composing, as normative orders which interactants could invoke, comes in various forms. When helpers initiated verbal composing, their suggestions typically were rejected as in some way odd, or they were accepted, but only as solutions to dead ends in story development. As evidence of the writer's right and obligation to compose we have the recurrent fact that helpers waited for writers to formulate ideas for a next sentence after the conclusion of inputting the last sentence on the screen. The claim that the writer was responsible for what ended up on the screen receives support from the way the teacher corrected the hard copy of the story, almost

always addressing the writer. As well, there are places on the tapes where helpers disclaimed responsibility. For example, when one writer was trying to come up with a title, his helper said: "It's not my problem, it's your, it's your turn."

Further evidence supporting the above formulations of enforced rules for organizing composing efforts will be introduced in the discussion of composing practices.

Level Two

At the level of inputting, the configuration of rights and responsibilities was similar to, yet differed from level one. On the writer's side, the one difference was that no obligation to input was displayed or enforced. On the helper's side, the right to act was stronger, and more delimited, than at level one. I say that the helper had license to input in order to convey the idea that when the helper did input, it was usually under the authority of the writer, who could be said to have issued the license. In that inputting was delegated, it seems that neither side in the relationship felt that the writer was obligated to do the actual inputting.

The helper's rights at this level seem more closely to have flowed from the technical ability ascribed to her or him as an incumbent of the position of helper. The helper presumably knew the keyboard better than the writer. This presumption seems to have held true in spite of the differentiation of the instrument of writing into display and executive keys. The writer made use of the former, while the helper had primary responsibility for the operation of the latter. However, the helper, having been at the computer more than the writer, i.e., having been at the keyboard as both writer and helper, had the opportunity to become more familiar with the display keys. This would have been doubly the case when the helper was given the license, repeatedly, to input. The more the helper was licensed to use the display keys, the more reason there would have been to let the helper input.

Evidence for the organization of rights and responsibilities at this second level is provided from consideration of practices of student dictionary use. A student dictionary was a blank, lined workbook, with a letter of the alphabet printed at the top of each of 26 pages. When students came up with a word they needed to know the spelling of, they took their dictionary to the teacher, who printed the word on the appropriate page. All students in Mrs. Purdy's class had such a dictionary. Sometimes both the writer and the helper would have their dictionaries at the Computer Centre, thus increasing the number of words at their disposal for use in story inputting.

I say that the helpers and writers displayed an orientation to the license of the helper because of the way in which dictionary use was organized. With some regularity in my tapes the following pattern emerged. If the owner of the dictionary which had the needed word was the writer, the writer would input while consulting the dictionary, or the writer would dictate the word to the helper, thereby issuing a license for the helper to input. However, if the owner of the dictionary containing the needed word was the helper, the helper would dictate to the writer, allowing the latter to do what he or she had responsibility for: inputting. Occasionally, helpers would hand over the dictionary to the writer for the writer to use while inputting.

What was least likely to happen was the helper inputting directly from her or his dictionary. In cases where this did occur the writer was occupied with some other task, e.g., talking to the teacher, or going to her or his desk to get something. In one instance where a

helper input directly from his own dictionary, the writer authorized the inputting, saying that the helper could go ahead because he ha.. the word, "baseball," in his dictionary. In that the helper commenced inputting before the writer issued his authorization, the instance appears to have been a case of the writer "normalizing" what would otherwise have been an apparent violation of the preferred order: the helper acting on his own initiative, without license.

Level Three

At the third level the allocation of responsibility shifts from writer to helper. However, at this level, unlike at the other two, both interactants recognized each other's right to act.

As the "expert," the helper had responsibility for seeing that all arranging acts were taken, i.e., that the executive keys were used correctly at the correct point in the text's production. On the Apple II+, using the Write/One program, these were the left arrow key (which achieved deletion of the character to the left of the cursor), the right arrow key (which made space for the insertion of text), the space bar, the shift key, and the return key.

The cursor movements were not much used during inputting. They required the use of six keys. To move the cursor left, without deleting any character, the shift key had to be depressed in tandem with what was usually a display key: left angle-bracket/comma. To move the cursor right one character, the shift key had to be used in conjunction with the other bracket key: right angle-bracket/period (see Appendix). To achieve cursor movement up one line, the control key and the T key had to be depressed simultaneously. To move the cursor down a line, the control key had to be held down while the B key was depressed.

What is most interesting about the differentiation of responsibility for inputting and arranging acts is the way in which this distribution was facilitated by the organization of the hardware and software. This organization, in turn, rendered rational the seating arrangement preferred at the computer. The writer sat, typically, in front of the computer, with the helper seated most often in the chair to the right. Now, note that the executive keys are arranged around the edges of the Apple II+ keyboard like a wide U (see Appendix). By sitting on the right side of the writer, the helper had access to all the executive keys required to run the program and arrange the text, with the exception of the control key, which is at the left side of the keyboard. The writer had easy access to all the keys on the board, and thus was in position to exercise the right to input, and the right to arrange.

Given that both parties had the right to arrange, it is not surprising to find that use of the executive keys was sometimes competitive. Writer and helper in each session of story writing had to work out who would use the executive keys. Sometimes it was done by the helper announcing what he or she was going to do next. At other times, the helper simply waited to see what the writer would do after inputting a word. If nothing was done, the helper would hit the space bar, thereby moving the cursor in preparation for inputting the next word. Typically, the helper hit the space bar after inputting a word for the writer.

The three levels of rights and responsibilities formulated here were re-achieved in each instance of collaboration, though there were occasional variations in what was achieved. For example, in one episode the helper began acting like the teacher; she began instructing the writer, leading her with directives and questions

about what she wanted to do next, making suggestions as to what should be added to the story at varying points. However, the writer would take only so much of this before she would hold up her hand, "holding off" the helper and apparently giving herself time to think. In that the writer asserted rights-to-compose, and the helper did not push her self-ascribed "teacher rights," I interpret this interaction episode as being a variation built upon the distribution of rights and responsibilities discussed above.

For the account being developed here, I shall be concerned only with the above three levels of normative order. These were enacted and enforced as constitutive of collaboration, as opposed, e.g., to normative orders constitutive of peer-teaching (see Cazden, Cox, Dickinson, Steinberg, and Stone, 1978). Put differently, the above normative order of rights and responsibilities, combined with, and enacted by, the practices to be discussed, are constitutive of what can be called writer-helper collaboration (4).

PRODUCTION PROBLEMS AND COLLABORATIVE WRITING BY NOVICES

The locational and directional production problems which were examined earlier were formulated in terms of writing activities done in a solo mode. The question which now can be taken up is how the tasks and problems of writing are altered by the presence of an Other who has some rights and responsibilities regarding the writing activity.

The two production problems are altered, in systematic ways. The location problem becomes: "Where are we?" The direction problem remains: "What next?", but it becomes a problem about "what we should do next." The problems are further altered by how rights and responsibilities for composing, inputting and arranging are distributed between collaborators.

However rights and responsibilities are divided on the three levels of writing, a set of social coordination problems intersects the solution of the two production problems. Not only must a writer solve her or his own location and direction problems, but two interlocking coordinational problems must be handled. First, the designated writer has to work to make obvious or inferable 1) her or his orientation to production problems, and 2) how he or she intends to solve them. Second, the helper in the writing activity must determine 1) when the designated writer orients to production problems, and 2) how that Other intends to solve those problems. The problems can be called interlocking because the way in which the writer solves her or his coordinational problems can (but need not) provide resources for the helper to solve her or his problem. It is through handling this set of coordinational problems that participants achieve a working consensus on "where we are" and "where we are going."

The working consensus, logically, has an ordered character viz the solution of the production and coordinational problems. The ordering comes from the distribution of rights and responsibilities, as these are enacted by collaborators. Before inputting can occur, something must be composed. Initiating composing falls to the designated writer, as her or his right. If collaborators solve "where we are" and "what next" in composition, they can turn to inputting, where the helper sometimes acquires license to key in the words. Inputting, as a sequential activity done collaboratively, requires close coordination on solutions to the locational and directional problems. Before, during, and after inputting, arranging can occur. Either party can engage in arranging acts, but only the helper has

responsibility for how the text is arranged.

When the writers are novices, there is one less level of the production problems to face. Novices typically do not do planning which takes them beyond the next sentence they can think to write (Bereiter and Scardamalia, in press). This means that individually they likely do not encounter or conceive compositional plan location or plan direction problems. Hence, they do not need, or think to do, mutual coordination of their actions at the plan level. This does not mean, though, that they cannot initiate such planning. If they do, then collaboration will breakdown unless the initiator "fills in" the Other on where they are and/or where they are, or could be, going.

While the novice may have fewer levels of production to worry about, her or his work may be more difficult because of social coordination problems. Novice writers must find ways to work together without a plan for writing. Neither can rely, typically, on some overall plan as a way of understanding why one of them wants to transcribe or say this now. Without a plan, all the action, attention and coordination, has to be at the "point of inscription." This is the point of attention for analyses from a situated perspective. The question is how novices, through their practices, solve the production and coordination problems in collaborative writing.

PART V

We shall examine three sets of practices which handle writing production problems as they arise at the three levels of computer writing: composing, inputting and arranging. Practices at the first two levels, where only one participant has strong rights, are collaborative. At the level of arranging, both parties have equal rights, and practices are coordinated, but not strongly collaborative.

COMPOSING PRACTICES AND PRODUCTION PROBLEMS

In line with ethnomethodology's preferred way of conceiving social action, I formulate collaboration in terms of typical, uniform, repetitive, cohort independent practices.

At the computer, writing is talk. The collaborative practices of interest, thus, turn out to be discourse practices. These practices contribute to solving the production problems and coordination problems introduced above. In composition, three practices are noteworthy: candidacy, cloze and oral reading. Of the three practices, two make contributions to handling the directional production problem, while the third can be used in ways which contribute to solving both production problems. And all three aid in social coordination of production.

The candidacy practice solves the "what next?" problem at the text level, and therefore at the document level. The practice consists of the designated writer taking a turn at talk which occupies itself with generating candidate text. The practice can be initiated at the beginning of a story, or after the inputting of any sentence. It is concerned to produce a story part. A "story part" can be a complete a sentence, or, a story part can be the initial part of a sentence.

The following example comes from a story called "It's Spring." The designated writer will be called Vince (5). Vince had Norm as his chosen helper. After the second sentence of the story had been input we have Vince saying:

1 V: 'We can play:::tag'..No...'The sun is bright'.'The sun is bright in spring'.

In this turn Vince is presenting candidate story parts, which I have marked in single quotation marks. Three candidates are presented, with an evaluation/decision being voiced after the first. Vince rejects "We can play tag" (in the transcript, colons are used to mark an elongated sound). He builds a second candidate, then follows it quickly with an extended version which connects with the title of the story.

After any turn which presents candidate story parts, other candidates may be offered, with the helper furnishing candidates too. But the helper usually only formulates candidates after the writer has demonstrated the form of the story part he or she is considering using/inputting.

The candidacy practice solves the two interlocking coordination problems. By uttering words which are hearable as a candidate story part, as opposed to words hearble as conversationally addressed to the helper, the designated writer displays an orientation to the direction production problem of "what next?". By verbally producing a possible story part, the writer makes available to any hearer (something like) a "tentative intention" to solve the direction problem in a particular way (6). And on the other side, the helper in hearing/interpreting the writer's talk as offering a candidate story part, solves her or his problem of determining when and how the writer intends to solve the directional problem of "what next?"

The use of the candidacy practice, as initiated by the writer, can occasion the use of a cloze-like practice by the helper. Persons familiar with cloze devices for measuring reading comprehension will no doubt recognize a relative of this practice in collaborative writing. In tests of reading comprehension, students are given passages of text which paraphrase, or in some way formulate a passage which the student has been assigned to read. In the measurement passage blanks appear in the text. The student must "cloze" the sentence by filling in the blank. How the student fills in the blank is treated as evidence of the student's comprehension of the assigned passage. Such a cloze sentence might read: "Silver Cloud helped his mother make maple _____."

In collaborative composition, the writer produces a candidate story part, which is hearable as an incomplete sentence. The helper aids in solving the "what next?" problem by "filling in the blank": offering a candidate cloze part. For example, from Vince's story:

```
     V:   The sun is::/
30   N:   (/old the sun costs colda hurryup) hot/
     V:   /is::/
     N:   /'hot'
```

The oblique at the end of one line and at the beginning of the next marks "latched turns," where there is no gap, but no overlap between turns (see Sacks, Schegloff and Jefferson, 1974). What appears on line 30 between parantheses is my rendering of what it sounds like Norm is saying. Norm seems to generate a number of candidate cloze items, until he hits on "hot," which he utters with emphasis. Vince repeats the end of his candidate story part, again elongating it, and Norm repeats his preferred ending.

What is most interesting about the candidacy practice and the cloze practice is their "offered" character. The candidate is a tentative part of the story, but tentative parts need not be voiced. When they are voiced, they are made hearable as candidates. Since

the writer has the right to input whatever he or she desires, the voicing of a possible story part marks that part as only a candidate. It announces what may be input next. It tells the helper where the story might go. Since the writer does not have to voice candidates, the decision to do so could be a display of a concern for helper approval, or acknowledgment of the writer's candidate story part. Even though the helper's right to compose is only an incidental privilege, the writer's voicing of candidate story parts both offers and validates that privilege.

The fact that the helper offers candidate cloze parts entails recognition of the writer's responsibility for what is composed. In that the writer is taken as the person having the final say on what will become the story, the helper's offered cloze parts necessarily have only a candidate status. The offering of cloze parts displays to the writer that the helper is attentive to the production problem at hand: "what next?" Further, it displays that the helper has a sense of the writer's projected direction for the story. Both the writer's and the helper's practices are important for how they simultaneously solve the directional production problem, and achieve coordination of any such solution. The private cognitive processes of composing are collaboratively divided, shared and made public.

The third practice is oral reading. Rather often during the course of a writing session the story on the screen will be read aloud by the writer, or the helper, or by both students. The reading is sometimes accompanied by one or both students running a finger under words as they are pronounced. The practice no doubt has uses and effects which observers cannot recover. As mature writers will sometimes read their text to see how it sounds, or to get a "running start" to break through a problem in deciding what should be said next, the practice could have similar functions for students.

As students use the practice, it seems to work as a device for collecting attention and directing it to what has been input so far. Thus, it provides a way of solving the "where are we?" production problem. It pulls attention over the document-so-far, rendering it publicly as the text-so-far. To appreciate how it works at both the document and text levels of the locational problem, consider that it would be possible for Primary Level collaborators to run fingers under the graphemes on the screen, without publicly decoding to sound. In such circumstances, the participants would achieve a coordinated understanding of where they were in the document, but it would be an open question as to whether each apprehended the same meaning, i.e., text. Thus, it would be unresolved as to whether each could be said to be at the "same location" in the <u>text</u> when coordinated silent reading of the document stopped (7).

The oral reading practice can solve the locational problem, and also serve to resolve the directional problem when the orally read document/text is incomplete (8). When the oral reading practice was used on incomplete story parts it operated in a way similar to the candidacy practice. It occasioned the offering of candidate cloze parts. Such parts were often produced in the discourse as if they were a continuation of what appeared on the screen. For example, in one story, where the screen displayed the last line in the document as "She is printing", the writer read aloud "She is printing", and the helper chimed in, without a gap, completing the sentence with a candidate cloze part: "her story." Through this precision timing, the helper displayed an appreciation of "where we are" in the text and "what (could be) next" (9).

Through the candidacy, cloze and oral reading practices the

writers met their responsibility and obligation to compose, with helpers collaborating in more than just a technical capacity. Even though the mandate of the helper was limited to offering technical support needed for the writer to use the computer, the three practices outlined here were widespread. Thus, for my set of observations, work on any story produced with a helper involved the writer and helper as "senior" and "junior" author, respectively. Helpers exercised their appurtenance, their incidental privilege, to compose in all cases.

INPUTTING PRACTICES AND PRODUCTION PROBLEMS

Inputting practices consisted of verbalizing, searching and checking. The practices were linked, and can be analyzed as having a number of functions in relation to the two production problems. As inputting always occurred after the public composition of some story part, collaborators could be said to know where they were in document/text production. Or, more phenomenologically, where they were in the text was bracketed (see Husserl, 1962) as a concern while focal attention was turned to inputting of text. Inputting practices turned an oral representation of the text into an electronic representation: a screen document. When within the writing activity enclave of inputting, collaborators had to solve the problem of what letter to input next. For solution of this problem, student "dictionaries" were important.

Verbalizing took two different forms, having different apparent functions. If one person verbalized the letters to be input while another person did the inputting, the function was interactional, in the sense of communicating information. This verbalizing was like dictation. The method of dictation was one letter of a word at a time. The dictator would say the letter, then wait for the other person to input the letter. The dictator would then say the next letter, and wait for it to be input, and so on, until the entire word had been input. Completion of dictation would be marked through prosody and/or paralinguistic moves and gestures.

I observed no cases of a student dictating an entire word, or a sequence of letters, without timing the delivery of the dictation to alternate with inputting. If dictation was interrupted, the dictator typically would reinitiate the dictation from the beginning of the word. The dictator did not depend on the person inputting to remember what had been dictated before the interruption. Reinitiating the dictation from the beginning of the word solved the locational problem after the interruption of "where are we now?" By alternating dictation and inputting of letters, collaborators were assured of not losing track of where they were at the level of inputting.

Dictating optionally was combined with a checking practice. When combined, the dictator pronounced the letter, while looking at the word in a dictionary, then watched the video screen to check whether the letter displayed on the screen was the one just uttered. If it was not, the dictator would engage in repair practices (cf. Schegloff, Jefferson & Sacks, 1977), gasping, or saying something like "No," which brought a quick response form the inputter, who corrected the error.

In the second form of the verbalizing practice, the person inputting verbalized what was input. Verbalizing usually preceded or coincided with depressing a key. The function may be interpreted as interactional in two ways. It obviously let the other person know where the inputter was in the inputting process. This was a trivial function, in that the other person could observe the video screen, or

watch the inputting itself.

The other interactional function of verbalizing was more subtle, and consequential. To appreciate the function, it is important to note that while the inputting was occurring, the other person did not speak, or at least did not speak to the person inputting. This simply may have been a courtesy extended to the inputter, but I conjecture that the silence occurred on the part of the other person because the inputter verbalized what was being input. The inputter took a turn at talk, and thus could have been oriented to as having the floor for the duration of the turn. If verbalizing held the floor, it prevented other demands from being made on the inputter, e.g., to compose.

Verbalizing assured interactional "space" for inputting to be done. When it ended, the floor was again open for the taking. If this conjecture is true, then it did not much matter whether the verbalizing preceded, coincided with, or followed each strike of a key: the floor still would have been held. The inputter would have had some protection against competing demands on her or his processing capabilities and time.

There was a second possible function of verbalizing, a function which aided solution of the locational problem at the individual level. This function was served when the inputting task was handled solely by one party, usually the writer. Verbalizing the letter while looking at it on the page of the dictionary loaded the sound of the letter into auditory memory. With the letter in both visual and auditory memory, the inputter had a better chance of remembering what letter needed to be found during the search of the keyboard. During this search more information was being introduced into short term visual memory from the keyboard, perhaps making it more difficult to succeed if memory of the letter were only visual.

Inputter verbalizing at times operated in conjunction with two other inputting practices, searching and checking. The inputter who used a searching practice to find a key usually verbalized the letter prior to depressing the key. Or, the verbalizing was an accompaniment to the search, with the letter being repeated, or sounded in an elongated form.

In calling searching a practice I am making reference to something having the character of a strategy, or at least a tactic. I observed the same students in October of 1983, at the beginning of their year in first grade. Then they were running through Write/One's keyboard familiarization programs. Those programs required the student to find and depress the key having the letter presented on the screen. At that time I observed the use of strategies which some students seem to have carried over in their videotaped writing efforts, at the end of first grade.

The one strategy worth noting was the one used by the students whose response time was the fastest, and who seemed to experience the least amount of frustration. Those who did not use this strategy just let their eyes roam over the terrain of the keyboard. Those who did use the strategy roamed the terrain with their finger. The strategy involved moving a finger over the keys, using the finger as a pointer. The movement of the finger was not random. Instead, it was remarkably consistent between students in the path it covered. The student would usually begin with the finger at the left side of the bottom row, and sweep to the right along that row (see Appendix A). At the right end of the row, the finger would move up a row and sweep left, then up a row and sweep right. There were variations in how this strategy was carried out, but it assured that most of the keyboard's terrain would be searched, resulting in the letter being

found. If it was not found, the strategy was repeated.

Some students used this strategy to search for letters while inputting during story writing. It seemed to come into play when the letter was one not used repeatedly in their stories. The student who was most frequently asked to be a helper was the student who used this practice most, and most efficiently when the needed key was not quickly sighted.

The other practice used with verbalizing was checking. As mentioned above, dictators could check what was input. Persons inputting from dictation could, and did, check as well. Consistent with the character of inputting from dictation, they typically checked each letter after it had been input. Persons who were inputting directly appeared to check after each letter was input, or not until the entire word was input. The choice of when to check made a difference to how long it took to input a word. Checking after each letter meant that inputting took longer, but it assured that what was displayed on the screen corresponded to the keys depressed. Whereas, checking after inputting made the process faster, but less safe from error.

If inputting were done from dictation, checking on a letter-by-letter basis may have been preferred, as the dictator may have been checking the screen, too. Again, the presence of another person may have had consequences for how the writer or helper behaved. In this case, the issue looks to have been a moral one. The concern would have been a loss of face with the other person if the inputter had been seen to make an error. Since the students were quick to point out errors, moral issues looked to have been lively concerns for them.

With the practices of inputting, we have seen that both writer and helper can be involved, even though only one of them did the actual pressing of display keys. This was clearest in the case of the two forms of the verbalizing practice. It could have been true during the use of the checking practice, since both persons were free to check the screen. The searching practice seems to have been the only one which was carried out by only one person. But even in the case of this practice, the presence of the other person could have made a difference.

A letter had to be input before the next collaborative action could occur, so there was possibly the pressure of the sense of the other person waiting for inputting to be done. Secondly, there was the very real possibility that the other person would invade the terrain of the keyboard to "help" in the search, or to take over the search if it seemed not to be succeeding. Since helpers typically knew the keyboard better than the writer, they were often ready to take over inputting. It was not unusual to see a writer push away the invading hand of a helper. And on the other side, the writer could assert responsibility for inputting, taking over, or putting pressure on the helper to get the job done.

While only one person was inputting at a time, both were involved. Through the exercise of the above practices, collaborators achieved a finely calibrated sense of where they were, and what came next in inputting.

ARRANGING PRACTICES AND PRODUCTION PROBLEMS

Interestingly enough, arranging acts were the least collaborative of the three types of writing acts. The competition which sometimes occurred between the writer and the helper made visible the claims of participants to equal arranging rights. Recall, though, that it was the helper's responsibility to see that the screen document's arrangement (its 'composition') reflected appropriate formatting conventions given how the text could be read. Given this responsibility, the "default value" in the setting was such that the helper would exercise her or his arranging rights, unless the writer vied to arrange document features, or solved the arranging requirement in the course of continuous inputting. Occasionally, but rather less often than the teacher would have liked, helpers instructed writers as to what should be done, by way of arranging. When such instruction happened, as when a helper said to the writer: "put a space", arranging can be spoken of as having been collaborative.

Arranging, as it was done by the first graders I observed, primarily involved cursor movements and deletions. Deletions handled perceived errors in inputting as well as (rarer) changes in what writers wanted to stand as the text. Arranging of this sort operated in a different relation to writing than the subtasks of composing and inputting.

In stylus writing/transcribing, the movement of the stylus is incorporated into formatting of texts. How this is done depends on whether words are printed or written cursively. If one prints, then the stylus is lifted and moved to the next place where a letter will be printed. If one writes a word cursively, the stylus usually is not raised until the entire word is written. Then one lifts the stylus and dots any "i" and crosses any "t". Printing is most like inputting in that each letter requires stylus movement down to and up from the page, just as a separate key must be depressed for inputting (lower case) letters.

While in learning to print one does not have to be taught how to form a "space," one has to learn to "leave a space" between letters, with a bigger space between words. In transcribing using a keyboard a space between words is not "left," it is "put." One must depress the space bar to clear (10) a space after a letter or symbol. Leaving a space in printing involves <u>not</u> putting the stylus down, not "depressing" it. One typically moves the stylus "over" the area which is created as a space when the first letter of the next word is printed.

This differentiation of transcribing into inputting and arranging acts in computer writing provides for the separation of rights and responsibilities discussed above. As arranging acts are separate acts in the writing process, the question can be raised for each such act as to its relation to the composing and inputting processes. While the relation to inputting is obvious, as arranging lays out the document to represent the text to readers, the relation to composing is less obvious.

The relation of arranging to composing of most importance comes from the side of the reader. The format of the document, with wider spaces between some letters than others on a line, is used to decide what text the document was formatted to represent to the skilled reader. The text is taken to be the one composed by the author, unless we have reason to believe that something interfered with the printing of the electronic text, or unless the realized text does not make sense (see Heap, 1977). One reads through the spaces of the document to find the text.

In that the use of the space bar was the most prevalent arranging act in my corpus of writing episodes, it shaped the character of arranging's relation to inputting and composing in the computer writing which I observed. The relation was one where arranging/ /spacing could be said to have been "interleaved" between inputting and composing acts. The space bar was "hit" between words in continuous acts of inputting. Continuous acts of inputting were usually done by writers, with the writer doing her or his own spacing. But much inputting could not be said to be continuous between words. It was done more as "one word at a time." Between words, it was usually the helper who did the spacing, or reminded the writer that spacing must be done.

In that arranging was mostly interleaved and was concerned with the document, it stands in a different relation as well to the two production problems in the writing process. Spacing acts had a null value with respect to the text. One does not need to know where one is in the text to know that a space is needed after a word. One only needs to know that the last letter of the word has been input. Or one needs to know that the input word is the last one in the story part just composed. When a sentence-like series of words has been input, a punctuation mark is required. After a punctuation mark, at least one space is required. Arranging acts, like spacing, do not visibly solve for participants where they are in the text. Rather, collaborators already have to know where they are, collectively, in order to know that a space is required. If the arranging act is one of deletion, collaborators still need to know where they are in the text such that they could see that the screen document, as it appears, does not represent what they want as text.

As to the directional problem, the situation is much the same. Spacing is a precondition to inputting whatever is next, but it does not decide what is next. Here it is fascinating to observe the videotape of two students, Vince and Norm, argue about candidate cloze parts within one compositional sequence.

```
     V:   The sun is::**/
30   N:   (/old the sun costs colda hurryup) hot/
     V:   /is::
 -   N:   'hot'
     ?:   (p is maught)
     N:   */
35   V:   /'bright'/
     N:   /*/
 -   V:   /no: 'bright'
     N:   'hot'!
     V:   'burright'
40   N:   (ho:::t)
     V:   'bright and hot', how's that? yeah
```

Lines 32 to 37, inclusive, are of interest here. After Norm, the helper, offered "hot" again as a candidate, and after some student off camera said something like "p is maught," on line 34 Norm reached out and hit the space bar. Latching this move, on line 35 Vince rolled out his candidate cloze part. Latched to this offering was Norm's hitting of the space bar on line 36. This was done, as on line 34, in a staccato manner. Both Norm and Vince were sitting back in their chairs, and on both line 34 and 36 Norm turned from facing sideways in his seat, orienting to Vince, and reached over to the keyboard and tapped the space bar (11).

Note the oriented-to difference between Norm's two spacing acts. The spacing act on line 34 seems merely inserted into the argument between the two boys. It is interleaved. It seems only coincidental that Vince's offering on 35 latches Norm's move. This is not how the latched turn seems on line 37. Convention required only one space be placed after "is" in the screen-story part "The sun is". By expressing his candidate cloze part on line 35, Vince already had registered his disagreement with Norm's candidate, "hot, "offered on line 32. I would argue that the latched "no" on line 37 responds to (and formulates) Norm's second spacing act as an apparent, unlicensed inputting move.

The first spacing act, on line 34, had the appearance of an arranging act. Thus, it carried no potential for resolving the collaborators' directional problem of "what next?" However, the initiation of the second act, on line 36, likely had the appearance of an inputting act. Interpreted in this way, Norm's second keyboard act did appear to have potential for resolving the directional problem. And the resolution was not one yet authorized or accepted by the writer. In my terms, the second act did not look like it was an interleaved act in the writing process. It looked like an act of writing.

Under the general heading of arranging, some further types of interaction should be mentioned. If we understand arranging to be concerned with control, then it is not stretching usage too far if we consider interaction which was prevalent, and concerned with control.

At some point during the production of most stories issues of control arose. The primary form had to do with seating at the computer. The students vied to use what I call the "driver's seat" (12). This was the seat directly in front of the computer. This was the seat from which it was easiest to use all the keys on the keyboard, and, therefore, the best seat from which to control access to the keyboard. The Computer Centre always had a second seat, placed to the right of the driver's seat. Occasionally, a third seat was at the Centre, placed to the left of the driver's seat.

No matter whose turn it was to be the writer, whoever got to the Computer Centre first would slide into the driver's seat. At the arrival of the designated writer, the helper would usually move over to the right side seat. Often the helper would sit on the left edge of the right side seat, almost sitting on the right edge of the driver's seat.

When the writer would get up, to have the teacher put a word in her or his dictionary, or to leave the Centre for whatever reason, the helper would sometimes slide into the driver's seat. On the writer's return, the helper usually would move back to the right side seat.

With some regularity, disputes arose as to where persons had a right to sit. At that point, they would formulate to each other what the rules for seating were. Often the solution came about by one student seeking to have the teacher ratify her or his version of the rules.

Such disputes would sometimes arise because of the presence of three chairs, but only two students. When there were three chairs, the left chair tended to overlap the space normally taken by the driver's chair. Confusion would arise if the writer took the left chair and tried to "drive" from it, with the helper too well positioned for the writer successfully to resist invasions of display key terrain. Or trouble would arise if the helper sat on the left side chair. Use of the delete key, which I consider an executive key, required the helper to cross the display key terrain. This in itself

became a problem only when the writer was engaged in inputting.

As the above already makes evident, access to, and use of, the keyboard was at times a contentious issue. The writer faced the most trouble when there were two helpers, one on each side. In such terrain disputes, which were mainly inputting and punctuation disputes, there was occasional grabbing of helper's hand. The helper's hand would be lifted from a key, shoved away, held immobile, or sometimes directed to a specific key.

When the teacher, Mrs. Purdy, used the Write/One program at the second grade level, she voiced and reiterated a rule that helpers were not to touch the keyboard. But at the first grade level, where students had less experience writing and found arranging text to be difficult, she found it necessary to allow helpers to touch and use the keys. While a system of enforceable expectations was invoked and used to organize and control access to the computer, circumstances occasionally arose where the expectations were unsuccessfully enforced, or were deemed somehow inappropriate.

What these "computer struggles" reveal is the importance to students of control over the text production process. The practices of composing, inputting, and arranging, all presuppose and provide elegant solutions to the problem of who will control what happens next, given certain enforceable expectations about rights and responsibilities. The problem of control is twinborn with the essential problem interactants face of communicating to each other what they are doing, and what needs to be done. Thus the problem of control is endemic to collaboration. It is easier to arrange text than it is to arrange collaboration. Fortunately, the students in this study were ingenious at accomplishing both.

PRODUCTION, COORDINATION AND COLLABORATION

The social organization of writing collaboratively at a computer, has been the focus of our concerns. This organization consisted of three levels of rights and responsibilities articulated to, and by, three sets of practices: composing, inputting and arranging. Taken collectively, the enacted normative orders and practices constituted collaborative writing in the settings which I observed.

In the very ways in which collaborative writing was constituted, production and coordination problems "at the point of inscription" were solved. Collaborators had to engage in four operations while composing and inputting:

1) orient to locational and directional problems.
2) display orientation to locational and directional problems.
3) grasp the Other's apparent orientation to, and solutions to, locational and directional problems.
4) solve the locational and directional problems of collaborative composition and inputting.

While I have laid these out as four separate actions, what we see from looking at collaborative writing is that utterances, qua practices, were multi-operational, multi-functional. In solving production problems through talking, speakers carried out the first two operations. And in order to coordinate actions, i.e., to collaborate, speakers had to listen so as to grasp Other's apparent orientation and solutions as these were displayed or formulated in talk and behaviour. In the end, but throughout as well, production problems and social

coordination problems were solved simultaneously through the composing and inputting practices formulated here.

Arranging practices, and the normative orders they enacted and required, had a different relation to the production and coordination problems. They were not carried out with displayed orientation to the locational and directional production problems of writing. I have argued that they were done as moves interleaved in the inputting process, and in some compositional sequences. As interleaved moves, they had to be coordinated in a double sense. They had to be coordinated to occur between other writing moves, but also they had to be coordinated so as to be done by one, and only one, person. Where composing and inputting were often done as what George Herbert Mead (1934) would call a social act--an act begun by one person and completed by another, arranging was mostly done as an individual act inserted between Meadian social acts. This feature, and its placement in writing, gave arranging its non-collaborative, but nonetheless coordinated, character.

CONCLUDING OBSERVATION: COMPUTERS, COLLABORATION AND LANGUAGE ARTS

In that I have formulated how writing was done collaboratively by novices at a computer, the question can be asked as to the practical, pedagogical advantages of turning writing into a coordinated, collaborative effort at the early Primary Level. I believe there to be many possible advantages, and some disadvantages as well (see Heap, 1985, 1986). Rather than close with an attempt to formulate the pedagogical value of collaborative computer writing, though, I want to draw attention to a wider arena of advantage and relevance of collaborative writing. To appreciate this relevance I need foreground the medium of expression which makes collaborative writing attractive and feasible: the computer.

Use of the computer has the obvious and important advantages (over using a stylus and paper) of allowing writers to input and arrange their screen documents with ease, to alter those documents and to read them. What observation has revealed, however, is that the computer adds to and compounds these advantages when used collaboratively. Through differentiating "transcribing" into inputting and arranging, the computer (as hardware-software) makes possible a mulititude of possible collaborative keying arrangements, only a few of which were enacted in the class which I observed.

In that the use of the keyboard had to be coordinated, verbal and non-verbal communication were required between collaborators. The computer can be said to have compounded the advantages it otherwise provided in its word processing mode by allowing, even virtually requiring, students writing together to use all of the language arts. During my observations, students spoke. They listened. They obviously wrote, but, as the prevalent oral reading practice made clear, they also read what they had verbally composed and verbally input. Hence, the use of the computer had a value that transcended development of the single language art which computer writing would otherwise appear to serve. The value may be especially felt in classrooms where the heritage language of students is other than English, as in Mrs. Purdy's class where all but three students had Italian or Portuguese as the first language of their parents (13).

What I hope can be appreciated from this research is that consideration of the place of computers in education must focus not on the context-independent features of hardware and software, but must focus on the situated, task-specific use of computers. That use always will be socially and culturally organized. In this essay I

have endeavored to unfold the micro-organization of one type of computer use as it articulated with levels and tasks of writing, comprehended from a situated perspective. The account provided here of collaborative computer writing can be understood as an example of what it means to "focus on the situated, task-specific use of computers."

NOTES

1. Elsewhere I have discussed the ways in which computer use modifies writing (Heap, 1985).
2. Currently underway is a three year research program on the social organization of writing with styli and computer in one combined first-second grade classroom, again taught by Mrs. Purdy. The primary focus of the research is collaborative writing. In this work, turn organization at the Writing Centre and at the Computer Centre will be a focus.
3. I say "select" because this category is provided from conversation analysis, but I do not think it fully appropriate. The choice claimed by conversation analysts (Sacks, Schegloff and Jefferson, 1974) is between selection techniques of current-speaker-selects-next and self-selection. This is too narrow and implies a binary logic. I see these two options as extreme poles, with an indefinite number of possible turn distribution "techniques" strewn between these poles. One can "provide for" someone as the next speaker by one's choice of topic or by what one says about it. One can "pressure" another to speak by making it somehow consequential for a specific Other if he is seen not to speak when he clearly had an opportunity, e.g., to clear up a misunderstanding. One can "allow" an Other to speak, where "self-selection" is made visibly optional, i.e., sensible but not required.

    On the other side of the gap, "self-selection" can occur out of very mixed reasons to speak, some of which are tied to one's reading of what Other is providing for, allowing, pressuring, etc. The interesting methodological problem is that while utterances at the extreme poles are easily described, adequately, the turn allocation phenomena in between are much less easily described with certainty. For any particular conversation, the analyst may have to have access to just the sort of substantive, situationally invisible phenomena which conversation analysts stays shy of: speaker biography, knowledge, purposes. If the analyst cannot assign speaker turn allocation moves to one of the binary categories in the recursive rule set defining conversation, then the rule set loses explanatory value. Fortunately, conversation analyses rarely depend on the rule set laid out by Sacks and his colleagues.
4. The claim here is based upon observations. The claim also is defensible ratiocinatively, using what we know as speakers about "what should be said when" persons act in certain ways (pace Austin, 1970). Being a claim that is defensible on both experiential and ratiocinative grounds, the claim is a priori, in Bradley and Swartz' sense (1979). It is not an empirical claim, in Kant's sense of something which can be known only through experience.

    Further, in the way that the claim about normative order and practices of collaboration can be judged cogent on ratiocinative grounds, the claim is quasi-analytically true. It is not necessarily true in all possible worlds, like an analytic judgment, but it is necessarily true in all worlds where it is possible, e.g., that such and such a distribution of rights and responsibilities count as writer-helper collaboration.

    Insofar as my account tells us what writer-helper collaboration <u>is</u>, rather than only what co-varies, empirically, with collaboration, my argument succeeds in developing a set of claims which, when taken

together, are quasi-analytic a priori judgments about culturally possible ways of organizing some activity. This is the type of claim set I regard as the aim of ethnomethodological inquiry (Heap, 1980a). It is also the type of claim set occasionally provided by inquiries which regard themselves as "empirical," e.g., conversation analysis (but see Coulter, 1983), and ethnographies of communication. Needless to say, the position offered here is "under development." It does not have an avowed circle of supporters.

5. Student names are masked.

6. I call the intention tentative, because the story part offered is only a candidate. It may not be input.

7. Oral reading by one or both collaborators, in itself, does not demonstrate that both parties understand the text in the same way. However, oral reading does provide an opportunity for both participants to "hear the document" and recall it as the words/text which they previously, verbally composed. Hence, the odds of them knowing where they are in text are better than if the location problem is solved purely by silent reading, or even by silent reading with the use of a finger as a place marker.

8. While the text's sentences may be deficient in syntactical ways which render them incomplete for a mature reader, what counts as incompleteness in the setting is a sentence which does not have a period. The absence of a period occasions work to produce text which would make it appropriate, in the view of the writer and helper, to place a period. As students were meticulous in putting in periods, the work of producing further text typically was addressed toward the last story part on the screen.

9. When the cloze practice is used with candidate story parts orientation is displayed to "what (could be) next," but not to "where we are in the text." This is because candidate story parts are only candidates, they are not yet, and may not become, text.

10. Interestingly enough, while all the keys on computer keyboards usually have one or more symbols on them, "space bars" are unmarked. They do not create a symbol on the screen, they just move the cursor. I say that depressing the space bar clears space because in all word processing programs with which I am familiar, the cursor keys cannot be used to move the cursor to any point on a screen unless space has been "cleared" using the space bar or the "carriage" return or enter key. In printing, space does not have to be cleared: it just has to be created by the placement of signs and symbols.

11. Why Norm cleared two spaces is unclear. Fortunately, my interest is not to produce a micro-history of exactly what every participant was doing and intended in each strip of videotaped interaction. The latter serves simply as a suggestive reminder and corrigible constraint in the enterprise of recollecting culturally possible ways of doing whatever it is that persons appear to be doing on my videotapes (see Heap, 1984). Thus my interest in this data strip is not as evidence for my view of normative orders and practices of collaboration. Rather, my interest in this data strip is in how it can be seen to exemplify the claims I make about normative orders and practices of collaboration (see Heap, 1980a).

12. This usage was adopted in my field observations during May, 1984. In January, 1985 I spent time at Xerox Palo Alto Research Park and discovered a grammatically related usage. When asking another person if he or she would like to operate the computer as it ran a certain program, personnel at PARC would say something like "Would you like to drive?" When I inquired into the genesis of this usage, I was told that it was picked up from researchers working at MIT who had visited

PARC fairly recently. Driving seems an appropriate metaphor for user controlled software, as opposed to designer controlled software (e.g., Computer Assited Instruction), which can be said to drive the user.
13. In this regard it is interesting to note that there were no unambiguous, intelligible utterances in my corpus which were in a language other than English.

During a discussion of my materials at UCSD Peg Griffin raised the intriguing possibility that Norm's first try at formulating a candidate cloze part (see Part V, Composing Practices and Production Practices) may have been articulated in Portuguese: "(/old the sun costs colda hurryup) hot/". The audio channel data is too ambiguous on this point to resolve the question, thus I have stayed with my English rendering of what it sounds like Norm was saying.

REFERENCES

Austin, J.L. (1970). Philosophical Papers. New York: Oxford University Press.

Bereiter, C. (1980). "Development in Writing." In L. Gregg and E. Steinberg (Eds.), Cognitive Processes in Writing. Hillsdale, NJ: LEA.

Bereiter, C. & Scardamalia, M. (in press). "Cognitive Coping Strategies and the Problem of 'Inert Knowledge.'" In S.S. Chipman, J.W. Segal & R. Glaser (Eds.), Thinking and Learning Skills: Current Research and Open Questions, Vol. II. Hillsdale, NJ: LEA.

Bradley, R. & Swartz, N. (1979). Possible Worlds. Indianapolis: Hackett Publishing Company.

Cazden, C.B., Cox, M., Dickinson, D., Steinberg, Z., and Stone, C. (1978). '"You all gonna hafta liten": Peer Teaching in a Primary Classroom." In W.A. Collins (Ed.), Children's Language and Communication. 12th Annual Minnesota Symposium on Child Development. Hillsdale, NJ: LEA

Coulter, J. (1983). "Contingent and A Priori Structures in Sequential Analysis." Human Studies, Vol. 6, No. 4: 361-376.

Daiute, C. (1985). Writing and Computers. Don Mills, Ontario: Addison-Wesley Publishing Company.

Dickinson, D. (1985). "Collaborative Writing at the Computer." Paper presented at the annual meetings of the American Educational Research Association, Chicago, Illinois.

Flower, L. & Hayes, J. (1981). "A Cognitive Process Theory of Writing." College Composition and Communication, Vol. 32, No. 4: 365-387.

Garfinkel, H. (1967). Studies in Ethnomethodology. Toronto: Prentice-Hall, Inc.

Hayes, J.R. & Flower, L.S. (1980). "Identifying the Organization of Writing Processes." In L.W. Gregg, E.R. Steinberg, (Eds.), Cognitive Processes in Writing. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Heap, J.L. (1975). "Non-Indexical Action." Philosophy of the Social Sciences, Vol. 5, No. 4:393-409.

Heap, J.L. (1977). "Toward a Phenomenology of Reading." Journal of Phenomenological Psychology, Vol. 8, No. 1, Fall: 105-114.

Heap, J.L. (1980a). "Description in Ethnomethodology." Human Studies, Vol. 3, No. 1, January: 87-106.

Heap, J.L. (1980b). "What Counts as Reading: Limits to Certainty in Assessment." Curriculum Inquiry, Vol 10, No. 3: 265-292.

Heap, J.L. (1981). "Free-Phantasy, Language, and Sociology: A Criticism of the Methodist Theory of Essence." Human Studies, Vol. 4, No. 4, October-December: 299-311.

Heap, J.L. (1983). "On Task in Discourse: Getting the Right Pronunciation." Paper presented at the annual meeting of the American Educational Research Association, Montreal, Quebec.

Heap, J.L. (1984). "Ethnomethodology and Education: Possibilities." The Journal of Educational Thought, Vol. 18, No. 3: 168-171

Heap, J.L. (1985). Collaboration in Word Processing. The Impact of Technology on Education: The Evolving Role of the Student. Toronto: Ontario Ministry of Education.

Husserl, E. (1962). Ideas: General Introduction to Pure Phenomenology. New York: Collier Books.

Husserl, E. (1969). Formal and Transcendental Logic. The Hague: Martinus Nijhoff.

Kantowitz, B. (1983). Human Factors: Understanding People-System Relationships. New York: John Wiley & Sons, Inc.

Levin, J. & Boruta, M. (1983). "Writing with Computers in Classrooms: 'You Get Exactly the Right Amount of Space.'" Theory into Practice, Vol. 22, No. 4: 291-295.

Levin, J., Boruta, M., & Vasconcellos, M. (1983). "Microcomputer-Based Environments for Writing: a Writer's Assistant." In A.C. Wilkinson (Ed.), Classroom Computers and Cognitive Science. New York: Academic Press.

Matsuhashi, A. and K. Quinn (1984). "Cognitive Questions from Discourse Analysis: A Review and a Study." Written Communication, Vol. 1 No. 3: 307-339.

Morrison, K. (forthcoming). "Stabilizing the Text: the Institutionalization of Knowledge in Historical and Philosophic Forms of Argument." Canadian Journal of Sociology.

Purdy S., & Purdy, T. (1983). Write/One. Toronto: Collier Macmillan Canada, Inc.

Riel, M. (1983). "Education and Ecstasy: Computer Chronicles of Students Writing Together." The Quarterly Newsletter of the Laboratory of Comparative Human Cognition, Vol. 5, No. 3: 59-67.

Sacks, H., Schegloff, E. & Jefferson, G. (1974). "A Simplest Systematics for the Organization of Turn-Taking in Conversation." Language, Vol. 50, No. 4: 696-735.

Scardamalia, M. & Bereiter, C. (1985). "Written Composition." In M.C. Wittrock (Ed.), Handbook on Research on Teaching, (third edition). New York: Macmillan.

Schutz, A. (1962). Collected Papers I: The Problem of Social Reality. The Hague: Martinus Nijhoff.

Sippl, C. (1983). Microcomputer Dictionary (2nd edition). Indianapolis: H.W. Sims.

Smith, F. (1982). Writing and the Writer. New York: Holt, Rinehart and Winston.

Wittgenstein, L. (1958). Philosophical Investigations. New York: The Macmillan Co.

Zaner, R. (1973). "Examples and Possibles: A Criticism of Husserl's Theory of Free-Phantasy Variation." Research in Phenomenology, Volume III: pp. 29-43.

APPENDIX

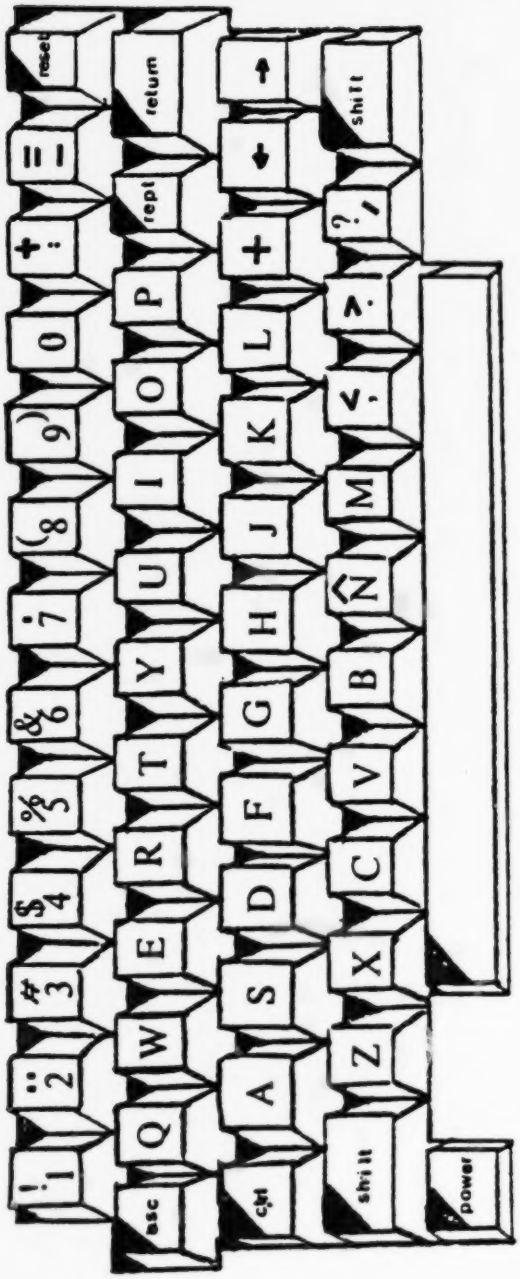
APPLE II+ KEYBOARD

Note the keys with the shaded corners: esc, ctrl, shift, power, space bar, shift, rept, return & reset.

In the composing and inputting phase of writing, these are the "executive" keys. The rest of the keys used in this phase are "display" keys.

In this phase the left angle-bracket/comma key and right angle-bracket/period key are interesting. They are display keys, but when depressed jointly with a shift key they operate as left cursor and right cursor keys, respectively.

Note the placement of the executive keys. These keys are arranged around the periphery of the display keys. The user who is "centred" at the keyboard has access to all keys. A helper has easiest access to executive keys on the side of the keyboard where he or she sits.



drawing by C. Bennett